PROGRESS ON A MARTEN LIVE-TRAPPING STUDY

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Live trapping provides an excellent opportunity for obtaining quantitative information on the ecology of the marten (Martes americana). De Vos (1952) suggested that "A long-range live-trapping study of fisher and marten should be undertaken to obtain more information on sex ratios, home range and population densities in different habitat." Preliminary findings from such studies were reported by de Vos and Guenther (1952), but otherwise the literature is almost devoid of truly quantitative data. Accurate information relating to population dynamics is seriously needed to guide restoration of depleted areas and to place management on a sustained yield basis. A study aimed at obtaining this information was begun in August, 1952, and will continue indefinitely. While it is not the purpose of this report to present definite conclusions based on one year's data, methods and preliminary findings from this investigation through September, 1953, are presented for the use of other workers involved in marten management and research.

STUDY AREA

Selection of a six square mile study area in Glacier National Park, Montana, was based on ease of access and indications of an abundant population of marten. This area is located west of the Continental Divide in the drainage of the North Fork of the Flathead River. Summer tourist travel is light and deep snows isolate the area in winter. The topography consists of foothill terrain extensively modified by valley glaciation. Elevations range from 3500 to 4800 feet. Although climax vegetation for most of the area is spruce-fir (Picea engelmanni-Abies lasiocarpa), very little of this vegetation type is now present. Recurrent forest fires occurring on various exposures have created a high degree of interspersion of seral stages and age classes. Portions of the study area recently burned are dominated by stands of lodgepole pine (Pinus contorta) of varying ages. Components of other seral communities are Douglas fir (Pseudotsuga taxifolia) and western larch (Larix occidentalis) with ponderosa pine (Pinus ponderosa) assuming cominance on southwest slopes. Vegetation of open meadows is predominately timothy (Phleum protense). Aerial photography and field reconnaissance will result in preparation of a detailed type map which will be correlated with marten activity and densities.

METHODS

Collapsible live traps produced by the National Live Trap Company, Tomahawk, Wisconsin, in the 6 by 6 by 19 inches model have proved to be most efficient. Trap sites were carefully

prepared in fallen logs and rotten snags with special chisels. Sets of this type functioned effectively even in adverse weather and offered excellent protection for captured animals. Experimentation with many types of baits has proved kippered herring to be most satisfactory. A scent composed of rotted fish and oil of catnip was used to lure the marten to the vicinity of the trap. The combination of techniques described has been highly selective for marten with relatively few captures of other animals. Other methods involving a variety of baits and ground sets were quite attractive to various rodents and birds.

Captured marten were handled through use of a wire cone which was attached to the opening of the trap. When the door was opened, the animals usually entered the cone freely but occasionally the use of force was required. The compressed cone was then detached from the trap with the marten held securely for examination. Numbered fingerling tags produced by the Salt Lake Stamp Company, Salt Lake City, Utah, were placed in each ear for future identification. Weights were taken to the accuracy of 25 grams with the marten held in the cone. Data recorded for each capture were tag numbers, weight, sex, condition of aging characters, indications of reproductive status, date and location of capture, and behavior.

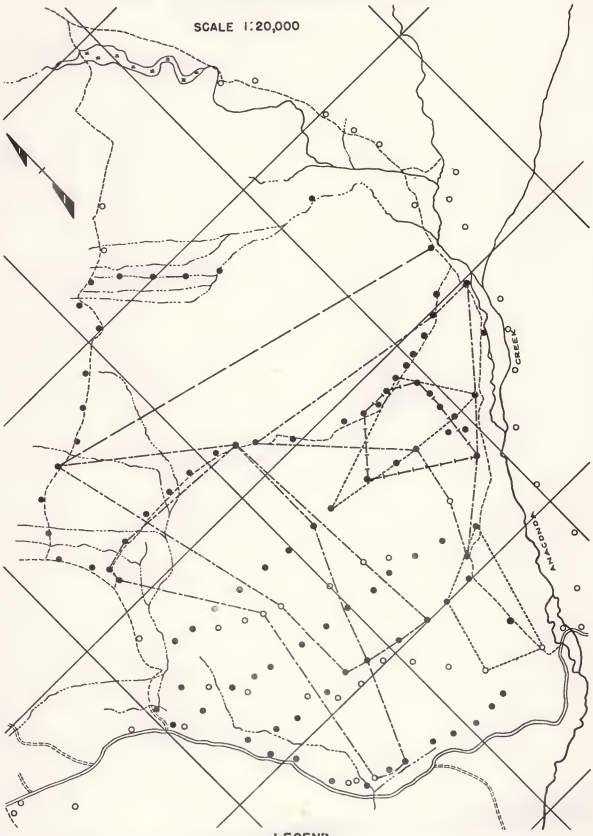
Strap type fingerling tags used for marking marten during this study are believed to be more successful than button type tags (Reynolds, 1953b) or battery-operated tattoo. No effort was made to apply the tags under aseptic conditions and some infection and sloughing of tissue was noted at the site of insertion. Tags were known to be retained in the ear for a period of at least three years on one occasion, while in a few other instances individual tags were lost in a matter of months. Continued experimentation with redesigned tags to eliminate pressure on the ear, with other types of tattoo and sterilization of the site of application will likely lead to improved methods of marking.

Difficult terrain, dense vegetation, size of the area, and lack of personnel prevented establishment of a true grid system of trap location. Trap lines approximately one-third to one-half mile apart were run from east to west, utilizing existing trails wherever possible. Trap sites were made along these lines at intervals of one-eighth to one fourth mile (Figure 1). Selection of trap locations was based on indications of marten activity near these sites. Plotting of trap sites on aerial photographs was accomplished by pacing along compass courses from ground reference points. Fluctuations in weights of individual marten captured frequently over extended periods indicated the inadvisability of long trapping periods. In order to minimize possible adverse effects, traps were moved from one portion of the area to another after a week's operation.

Sex determination was accomplished by palpation to establish the presence of absence of a baculum or through observation of the vulva. The experienced observer can, however, usually distinguish

Figure 1

MARTEN LIVE-TRAPPING STUDY AREA



LEGEND

- TRUCK TRAIL
- TRAIL
- PERMANENT TRAP SITE
- EXPLORATORY TRAP SITE
- MINIMUM FORAGING AREAS, ADULT MALES
- MINIMUM FORAGING AREAS, ADULT FEMALES
- MINIMUM FORAGING AREA, JUVENILE FEMALE
- PROPOSED TRAP LINE

between sexes on the basis of larger over-all size and broader head of the male.

Although techniques for aging marten from skeletal material have been suggested by Marshall (1951), these are of limited application in the field. The differential in weight between juveniles and adults was useful in aging for a limited period. According to Brassard and Bernard (1939), young marten attain adult weight at about three months of age. Our findings indicate that juvenile females usually reached adult size at this time but that juvenile males did not become of adult size until approximately one month later. The softer appearance of the juvenile pelage was a useful aging character until late September when growth of the winter coat had progressed considerably. Examination of the development of the sagittal crest (Marshall, 1951) and base of the baculum by palpation was utilized in aging males. Reference to materials from known-age marten showed that adult males had a pronounced enlargement of the corpora cavernosa and basal portion of the baculum while juvenile males lacked this development (Figure 2). Information on the nature of this difference was provided by the experimental work of Wright (1950) on long-tailed weasels (Mustela frenata). He obtained indications that increased production of androgens connected with attainment of sexual maturity stimulated development of the juvenile baculum to the adult type. Aging of females involved palpation of the sagittal crest with the addition of examination of the mammae. Females which had produced and suckled young had large, conspicuous mammae. Mammae of juvenile females were so small as to be difficult to observe even with extended, careful examination. Some females were tentatively classified as yearlings on the basis of greater development of the sagittal crest and lack of conspicuous mammae. Age determination of young marten was uncertain in the period between the attainment of adult size and the development of fully adult aging criteria. There is, however, some promise that with continued investigation and with more known-age material, techniques can be developed to distinguish a yearling class. At this time it seems safe to state only that juveniles may be separated from older classes with confidence until October.

TRAPPING SUCCESS

Using the trapping methods described, 223 captures of 53 marten were obtained from 1,912 trap units. Twenty-seven individuals or 51 per cent of the total were recaptured. The number of animals handled in this study was relatively small; it is believed that the 53 marten constitute almost all the residents and most of the transients which range through the area. The average effort required to capture one marten was approximately nine trap units. This compares with an average of 49 trap units in Ontario (de Vos, 1952) and 35 in Washington (de Vos and Guenther, 1952). As many as eight individuals were captured from 24 trap units in one day. Although marten on the study area may have become somewhat conditioned to the traps, this was evidently not a major factor in this trapping success, for trapping activities

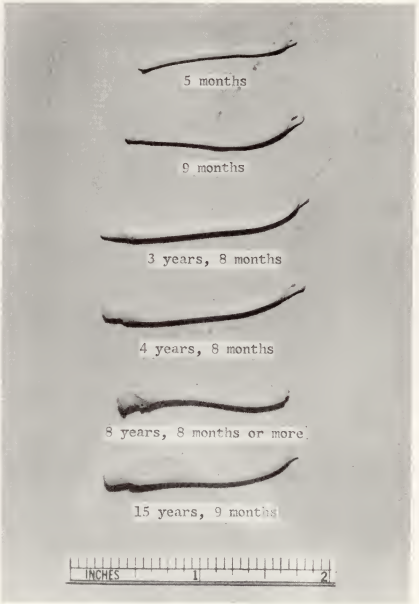

5 months
9 months
3 years, 8 months
4 years, 8 months
8 years, 8 months or more
15 years, 9 months
INCHES
1
2

Figure 2

outside the Park in an untrapped area netted five individuals from twelve traps in the first night of operation. Three more marten were captured from nine traps on the same three and one-half mile line the second night.

Trap mortality consisted on one juvenile female found dead in the trap on September 8, 1953. Autopsy by the Fur Animal Diesease Research Laboratory, Pullman, Washington, showed that the marten probably died of starvation with an accompanying anemia. A moderately large number of tape worms, not identified, were present in the small intestine. This marten had been captured for four consecutive days previous to the date of death. Weights of this animal ranged from 600 to 675 grams and averaged 633 grams, almost the same as the mean of 20 adult female weights. This raises a question as to population condition.

WEIGHTS

Twenty weights of adult females ranged from 550 to 775 grams, averaging 635 grams. Records of 69 weights from adult males varied from 725 to 1,250 grams, averaging 1,005 grams. On this basis, adult males averaged 59 per cent larger than adult females. Comparative figures from the literature are 55 per cent in Ontario (de Vos, 1952) and 12 per cent for Martes martes in Finland (Lampio, 1951). Although information from some months is not sufficiently complete, the records obtained provide an indication of seasonal weight variations. In September, the mean weight for adult males was 1,050 grams; three months later in December, the mean weight had dropped 200 grams to 850. Limited weight records from females were of doubtful significance in this respect.

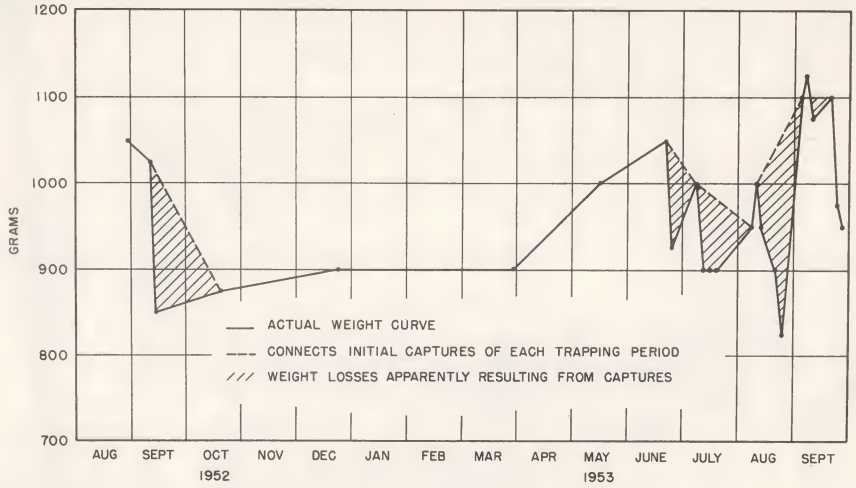
Weight loss sometimes occurred after captures on successive days. One adult male lost as much as 175 grams in one day (Figure 3). A similar pattern was evinced by juveniles, even during the period of growht. A juvenile male lost 200 grams during a two-week period of frequent captures. Losses were usually recovered after a few days cessation of trapping.

AGE AND SEX RATIOS

Sixteen marten -- 9 males and 7 females -- were tagged as juveniles. Thirty-six -- 21 males and 15 females -- were yearlings or older. One marten escapted before determination of sex was made.

Sex ratios of large samples of marten taken by trappers have varied from 150 to 180 males per 100 females (Twining and Hensley, 1947; Yeager, 1950; de Vos, 1952; Reynolds, 1953a). In the present study a somewhat lower ratio of 135 males to 100 females (30:22) are presented not as absolute values but rather to demonstrate a differential in the size of male and female foraging areas. Yeager (1950) pointed out that the wide foraging habits of the male most logically explained why more males than females were taken by commercial trapping. To our knowledge, quantitative

Figure 3



WEIGHTS OF AN ADULT MALE MARTEN

evidence of this differential has not previously been established. The data in Table 1 do, however, substantiate this theory. The

TABLE 1

MINIMUM FORAGING AREAS

	MALES			FEMALES		
	Area (Sq. Mi.)	No. Captures	Period (Days)	Area (Sq. Mi.)	No. Captures	Period (Days)
	0.40	48	393	0.12	11	372
	0.61	8	334	0.13	5	118
	0.68	10	365	0.11[1]	13	56
Mean	0.56	22	365	0.12	9.7	182

[1]Area occupied by a juvenile female from July 14 through September 8, 1953.

mean of minimum foraging areas for the males was approximately four times that of the females. Further indication of this difference in range is that distances between the most widely separated captures of the animals in Table 1 averaged 1.6 miles for males and 0.7 for females. In addition, all males captured more than once had a mean frequency of recapture of 9.2 times whereas the comparable figure for females was 4.4. This discrepancy in mean frequency of recapture may also be partially due to trap spacing improperly adjusted to the size of the female foraging area and to differential trappability. Experimentation with trap spacing may increase our understanding of this situation.

Captures on successive days at various times throughout the year provided records of 27 minimum daily movements of one adult male marten. These movements ranged from 0.1 mile to 1.3 miles with a mean value of 0.5 mile.

Continued investigation will lead to the accumulation of more information on all the points discussed. Emphasis will also be placed on the study of other factors which may influence population dynamics. When population densities for the area have been established, it is believed that such information will make possible development of standardized methods for the determination of population levels. This is essential to proper management of marten on a statewide basis.

SUMMARY

Progress is reported for a marten live-trapping study conducted in Glacier National Park. Methods used in trapping, handling, marking, and age and sex determination are described. Data on trapping success and trap mortality are presented and evaluated. Weights are analyzed with reference to disparity of the sexes, seasonal variation and frequency of capture. Age composition of the captured animals is given by two classes -- juveniles and yearlings or older. The preponderance of males in captures in the present study is compared with similar information from the literature. Data which imply an even sex ratio in resident animals are presented. Evidence of well-established foraging areas is pointed out. Apparent differences in range correlated with sex are indicated by greater minimum foraging areas and frequency of recapture of males. Minimum daily movements of an adult male marten are calculated from captures on successive days at various times throughout the year. Although it is not the purpose of this report to present definite conclusions, these preliminary findings illustrate the value of a long-range investigation of marten ecology based on live trapping.

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